22. *Lasionycteris noctivagans.* The Silver Black Bat is rather rare here. I have several times had specimens brought to me in winter that were captured in hollow trees.

23. *Vesperugo carolinensis.* This and the Red Bat are our two most abundant bats. Very common.

24. *Adelonycteris fusca.* Large Brown Bat. Rare. Only about a dozen specimens taken.

25. *Nycticejus humeralis.* The Twilight Bat is fairly common here, but never occurs in half the numbers of the Red Bat, or *Vesperugo carolinensis.*

26. *Atalapha borealis.* Red Bat. Abundant. This bat flies later in the autumn and earlier in the spring than any other of our bats. The number of young at birth is usually three, while in *Vesperugo carolinensis* and *Nycticejus crepuscularis* two is the normal number.

27. *Lutra hudsonica.* Otter. Occurs on all the larger streams. My brother, H. H. Brimley, has caught eight specimens at various times.

28. *Mephitis (sp).* A Skunk was killed near Raleigh a few years ago, the only one we ever heard of.

29. *Lutreola vison lutreocephalus.* Southern Mink. Common along water-courses. The females (and sometimes the males) are not infrequently brought to me as "Weasels."

30. *Putorius noveboracensis.* Weasel. One male caught by my brother, when trapping, January 13, 1888. I have heard of others, but have never been successful in getting them.

31. *Procyon lotor.* Raccoon. Quite rare in the immediate vicinity of Raleigh.

32. *Urocyon cinereo-argentatus.* Grey Fox. Not infrequently caught by fox-hunters in this vicinity. The Red Fox is said to occur in adjoining counties.—C. S. BRIMLEY.

ENTOMOLOGY.[1]

Insects Affecting Domestic Animals.—In the last issue of the new series of Bulletins of the U. S. Division of Entomology (No. 5), Prof. Herbert Osborn devotes nearly 300 pages to a treatment of this subject. The bulletin is an important and extremely useful one, with 170 illustrations. In the introduction there is a general discussion of parasitism from which we extract the following regarding the origin

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.

and results of parasitism. The problems of the origin of parasites, or the adaptation of certain forms to a parasitic life, are among the most interesting met with in biological investigation, but we can suggest merely some of them here.

It may be said from the biological standpoint that all parasites have been derived primarily from non-parasitic forms—a proposition which is supported by innumerable facts in their morphology and embryology, and which may also be argued deductively. Since many species are confined absolutely to certain animals as hosts, it is evident that they could not have existed as parasites upon such species at least before the occurrence of the host. Unless, therefore, we claim an independent origin for them subsequent to the origin of the host we must allow an adaptation from some free-living species or from a parasitic species on some other host, and following this back for its origin, we must ultimately arrive at a free form as the source.

In many cases the line of evolution is very apparent, as, for instance, the gradation between comparatively free and fixed Mallophaga, Acaridæ, Pulicidæ, etc.

RESULTS OF PARASITISM.

It is also interesting to inquire as to the effect of the parasitic life upon the parasite itself.

The natural tendency of an animal once started in the direction of parasitism will be to become more and more parasitic in habit, and with this habit a greater and greater specialization of parts with reference to this habit will be observed. The disuse of certain organs, as wings for flight and feet for ordinary locomotion, results in reduction or modification of these organs, and hence we find almost invariably that parasitic species are wingless, and that they have the feet adapted specially for locomotion among the hairs or feathers of the hosts. This adaptation is often looked upon as degradation ; but it seems to me preferable to consider it as a limitation in certain directions with specialization of certain organs. We consider the foot of the horse highly specialized, and we must admit that the animal is limited in its use, as it cannot climb trees, but we do not call the horse degraded.

It is true that the limitations for many parasites are so great that they are absolutely dependent upon certain hosts, and the presence of certain conditions for their existence—there is reduction or degradation of certain organs, but progressive specialization of those organs which remain functional. Often such specialization assumes a parallel character in widely divergent groups, as the clasping organs developed in

pediculids, mallophagids, hippoboscids, and sarcoptids. In other cases the same effect is attained by a different process, as the flattening of the body vertically in fleas and horizontally in most other permanent parasites. Modifications of the mouth-parts, eyes, and antennæ are very great, and furnish most striking examples of the modification of structures for the adaptation to special conditions.

Life-History of Coleophora malivorella.—In an admirable Bulletin (124 of Cornell Experiment Station), Mr. M. V. Slingerland discusses the Pistol Case-bearer, summarizing its life-history thus: The insect spends about seven months (from September 1st to April 1st) of its life in hibernation as a minute, half-grown caterpillar in a small pistol-shaped case attached to a twig. In the spring the caterpillars attack the swelling buds, the expanding leaves, and especially the flowers. About May 1st the cases are fastened to the twigs, where they remain for four days, during which time the caterpillars shed their skin or moult. They do not make any complete new suit as they grow, but are content with making additions to the ends and side of the old suit. They are not miners, but feed openly, eating irregular holes in the leaves, often skeletonizing them. They are most destructive on the flowers, where they eat the petals and stems. In the latter part of May they cease feeding, securely fasten the cases to the branches, and in about two weeks change to pupæ within. The moth emerges in two or three weeks, and soon glues its minute, pretty, cinnamon-colored, inverted cup-like eggs to the surfaces of the leaves. The egg-stage lasts about a week, the little caterpillar emerging about July 22d. They begin eating little holes in the leaves, and during their first meal construct of silk and excrement a small case or suit for themselves. They continue feeding on the leaves, adding to their suits from time to time, until about September 1st, when they begin to migrate to the twigs, and there fasten their little pistol-shaped cases to the bark. The winter is passed in these snug, warm, secure quarters.

Studies of Mimicry.—Col. C. Swinhoe, after studying and thinking over the general theory of protective mimicry, conceived that the subject should be advanced by the study of a small group of widespread mimetic species throughout the different countries included in its range. While the Bolina group of Hypolimnas contains according to systematists a number of species, they can all be merged into two, and it was these that he selected for his purpose. He describes in detail the appearances of these widely spread forms, and comes to the conclusion that the facts afford the strongest support to the theory of mimicry as

originally suggested by H. W. Bates; a variety of changes which occur are explained by this theory and by no other yet propounded. Local changes may be explained in many ways; but that they should invariably be in the direction of a superficial resemblance to one butterfly, and that one a specially defined species, is only to be explained by the theory of mimicry. Although much support has been afforded to this theory since Bates propounded it in 1862, Col. Swinhoe states that no evidence is so complete and convincing as that supplied by the genus Hypolimnas. If we are right in believing that the results are determined by the range and abundance of mimetic forms, it is clear that selection, rather than unguided variation, is the essential cause of the phenomena.—*Journ. Royal Microscop. Society.*

Remarkable Vitality.—Early in September, 1896 I collected two forms of life from Great Salt Lake, one was the brine shrimp *Artemia fertilis*, the other the larva of a fly, the *Ephydra gracilis.*

After keeping these in salt water for ten days I washed them in fresh water, and then placed them in a small vial *filled* with a 3 per cent. solution of formaline.

After they had been in this solution for ten days I had occasion to examine them, and on taking them from the vial I found that three of the Ephydras were still living and active. The vitality of the Ephydra seems to be fully equaled by the vitality of the *Stenophelmatus fasciatus* order Orthoptera. Some fragments of this insect were sent to the University of Utah for identification. Among the fragments was the prothorax bearing the head. This piece lived for nine days, and during that time when ever it was irritated would attempt to bite with its powerful jaws. It would also turn over into its natural position when placed on its back.—C. A. WHITING.

EMBRYOLOGY.[1]

Two animals from one egg.—To the many known cases in which two animals may be obtained from one egg by experimental interference, may now be added the amphibian *Triton cristatus.* By the aid of a simple piece of apparatus Amedeo Herlitzka[2] succeeded in

[1] Edited by E. A. Andrews, Baltimore, Md., to whom abstracts, reviews and preliminary notes may be sent.

[2] Archiv f. Entwicklungsmechanik. IV, März 2, 1897, pps. 624–654, pl. 27.